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Research Report

THE PHOTODYNAMIC EFFECT OF LED-MAGNETIC EXPOSURE TO PHOTOINACTIVATION OF AEROBIC PHOTOSYNTETIC BACTERIA

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ABSTRACT

All photosynthetic bacteria have a major pigment of bacteriochlorophyl and accessor pigment e.g. the carotenoids, which both have an important role in photosynthesis process. This study aim to explore the exogenous organic photosensitizer from photosyntetic bacteria for photodynamic therapy application. This study is an experimental research aiming to test the potential illumination of LED with wavelength 409, 430, 528 and 629 nm, and power optimization and time exposure LED-magnetic for optimum photo activation Rhodococcus growth. The reseach design use a factorial completely randomized design with factor of power and exposure time. The number of bacterial colonies grown measure using of Total Plate Count (TPC) methods. The result of anova test shows that irradiation treatment with LED 409 nm, 430 nm, 528 nm and 629 nm significantly affects on bacterial colony growth. LED 409 nm exposure has the greatest potential to boost the growth of bacterial colonies by 77%. LED exposure and the addition of 1.8 mT magnetic field increases bacterial colony growth by 98%. Results of optimization of LED and magnetic fields show power 46 mW and a 40 minute (energy dose 110 J/cm^2) optimum growth of bacterial colonies increase by 184%. So LED and magnetic illumination has potentially increased the viability of an aerob photosyntetic bacteria colonies.

Key words: *photosynthetic bacteria, optimum energy dose, LED-magnetic, Rhodococcus*

ABSTRAK

Semua bakteri fotosintetik memiliki pigmen mayor yaitu bakterioklorofil dan pigemen asesoris seperti karotenoid, yang memiliki peran penting dalam proses fotosintesis. Penelitian ini bertujuan untuk mengeksplorasi eksogen fotosensitiser organic dari bakteri fotosintetik untuk aplikasi terapi fotodinamik. Penelitian ini merupakan penelitian eksperimental bertujuan untuk uji potensi iluminasi LED dengan panjang gelombang 409, 430, 528 dan 629 nm, dan optimasi daya dan lama waktu pemaparan LED-magnet fotoaktivasi pertumbuhan Rhodococcus. Desain penelitian ini menggunakan desain acak lengkap pola faktorial dengan faktor daya dan waktu pemaparan. Jumlah koloni bakteri yang tumbuh dihitung dengan menggunakan metode TPC. Hasil uji anova menunjukkan bahwa perlakuan penyinaran dengan LED 409, 430, 528 dan 629 nm berpengaruh signifikan terhadap pertumbuhan bakteri. Pemaparan LED 409 nm berpotensi terbesar untuk meningkatkan koloni bakteri 77% . Pemaparan LED-magnet meningkatkan pertumbuhan koloni bakteri 98%. Hasil optimasi LED-magnet menunjukkan daya 46 mW dan waktu 40 menit (dosis energi 110 J/cm^2) optimum meningkatkan pertumbuhan bakteri sebesar 184%. Jadi iluminasi LED dan magnet meningkatkan viabilitas koloni bakteri fotosintetik aerob.

Kata kunci: *bakteri fotosintetik, dosis energy optimum, LED-magnet, Rhodococcus*